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Specification and Drawings, as originally filed, with Application for Patent Serial No:
2,436,368, on August 1, 2003, by LORNE CANVIN, for "Footwear and Insole Therefor".

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FOOTWEAR AND INSOLE THEREFOR

FIELD OF THE INVENTION

The present invention relates to footwear and more particularly relates to an orthotic insole for improved comfort and for providing an improved method of
5 sizing an article of footwear to the foot of a person using the orthotic insole.

BACKGROUND

Many types of strain or injuries have been known to be associated with footwear which provides inadequate support or support which is poorly tailored to a particularly wearer of the footwear. While custom orthotics are known for attempting
10 to correct the inadequacies of support to the wearer, known footwear is generally too constrained to provide proper space for a proper orthotic insole and does not provide sufficient insole variance to address the needs of wearers of the footwear.

SUMMARY

According to one aspect of the present invention there is provided an
15 article of footwear comprising:

an outsole for engaging the ground;

a shoe body supported on the outsole, including an internal foot bed for receiving a foot of a person therein; and

an insole having a depth which is at least 1/4 inch at a metatarsal
20 region thereof for supporting the foot of the person thereon;

the foot bed having an internal height which is suitably sized for comfortably receiving therein both the insole and the foot of the person supported on the insole.

According to a second aspect of the present invention there is provided
25 an article of footwear comprising:

an outsole for engaging the ground;

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a shoe body supported on the outsole, including an internal foot bed for receiving a foot of a person therein; and

an insole for supporting the foot of the person thereon;

the insole being formed of a material having a maximum compression
5 defined when additional force applied to the insole results in a substantially reduced rate of compression of the material;

the insole having a thickness and a durometer at a metatarsal region thereof such that the maximum compression is not reached when the insole is stepped on by an adult person of average weight;

10 the foot bed having an internal height which is suitably sized for comfortably receiving therein both the insole and the foot of the person supported on the insole.

Varying characteristics of the insole may include variations to durometer, thickness, footbed width, shape, heel suspension, arch support or any
15 combination thereof. A deeper interior in the shoe body for receiving a thicker insole in the order of 1/4 of an inch to 3/4 of an inch is preferred to permit maximum variability to the insole. Variations to the insole may be accomplished by provided numerous varying insoles associated with each article of footwear or by providing a common insole body associated each article of footwear which is adapted to receive
20 varying inserts therein to provide the ability to have insoles of numerous differing characteristics.

The insole may comprise an insole body and a plurality of inserts, each arranged to be received within the insole body to vary the characteristics of the insole body.

25 The inserts preferably include a metatarsal insert which is located at a metatarsal region of the insole. The inserts may also be located at a heel and arch

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region of the Insole.

The insole is preferably raised upwardly on opposing sides at a metatarsal region thereof.

Preferably the Insole has a substantially uniform thickness throughout.

5 An average thickness might be between 1/4 of an inch and 3/4 of an inch, but preferably the insole has a minimum thickness of approximately 1/2 inch. More preferably, the insole has an approximate thickness of 3/4 inch.

The metatarsal insert may include sides which are raised upwardly on opposing sides of the insole at a metatarsal region thereof.

10 The metatarsal insert may be received in a bottom side of the insole, wherein the insole includes recesses in opposed sides thereof for receiving the sides of the metatarsal insert upwardly therethrough.

In further embodiments, the insoles may include heating elements for selectively providing heat to the insole. The heating elements are preferably
15 thermostatically controlled and include respective switches for activation only when the insole is depressed by a foot of a person either standing or walking thereon.

According to a further aspect of the present invention there is provided a method of sizing an article of footwear to a foot of a person, the method comprising:

20 providing multiple articles of footwear each having a shoe body with differing internal dimensions and an outsole;

providing a set of Insoles associated with each article of footwear which is suitably sized to be received within the internal dimensions of the article of footwear, each insole of the set having differing characteristics than remaining
25 Insoles of the set;

selecting an article of footwear having internal dimensions which most

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closely accommodates the foot of the person; and

selecting an insole, of the set of insoles associated with the selected article of footwear, having characteristics which are most closely matched to characteristics of the foot of the person.

5 The insoles of each set may have differing durometer. The insoles of each set may also have differing foot bed dimensions upon which the foot rests.

When the insoles are raised upwardly on opposing sides at a metatarsal region thereof, the insoles of each set preferably have differing internal dimensions between the opposing sides thereof at the metatarsal region.

10 The set of insoles may comprise a single insole body and a plurality of inserts, each arranged to be received within the insole body to vary the characteristics of the single insole body.

 The inserts may be received in mating recesses in a bottom side of the insole body, the inserts being reduced in cross sectional dimension at a bottom side thereof in relation to a main portion thereof for wedging the inserts within the respective mating recesses.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings, which illustrate an exemplary embodiment of the present invention:

20 Figure 1 is a partly sectional side elevational view of an article of footwear having an orthotic insole therein.

 Figure 2 is a longitudinal sectional view of the orthotic insole of Figure 1.

 Figure 3 is a sectional view along the line 3-3 of Figure 2.

25 Figure 4 is a plan view of an intermediate layer of the insole according to Figure 1.

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Figure 5 is a top plan view of the insole.

Figure 6 is a schematic illustrating characteristics of the insole material.

DETAILED DESCRIPTION

5 Referring to the accompanying drawings, there is illustrated an orthotic insole generally indicated by reference numeral 10. The insole is intended for use in an article of footwear 12 to provide generally uniform support to the foot of a person. The insole 10 permits the article of footwear 12 to be readily customised by the end user by simply selecting appropriate support characteristics of the insole which most
10 closely match the requirements of the wearer.

The article of footwear 12 has a main shoe body 14 and an outsole 16 as found in common articles of footwear. The article of footwear 12 differs in that it has an especially deep foot bed for accepting thick insoles having a generally uniform thickness possibly in the order of one inch or more while still providing
15 sufficient space or height within the article of footwear to readily accept the foot of the wearer therein.

The insole 10 as illustrated, is formed of EVA injection moulded foam having a substantially constant thickness averaging between $\frac{1}{4}$ of an inch and $\frac{3}{4}$ of an inch. The insole includes a main body 20 having a metatarsal cavity 22 in a
20 bottom side 24 thereof for receiving a metatarsal insert 26 therein. A heel end arch cavity 28 is similarly provided in the bottom side of the body 20 of the insole for receiving a corresponding heel end arch insert 30.

Both of the inserts 26 and 30 are arranged to mate with the respective cavities in the body 20 of the insole in a snugly fitting configuration. The inserts may
25 be formed of a different material than the body of the insole to provide variations in durometer to the insole. The inserts 26 and 30 each have a decreasing cross

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sectional area at a bottom side thereof for mating with a narrower mouth portion of the respective cavity in the body of the insole. The narrower mouth of the cavities permit the respective inserts to be wedged therein for retaining the inserts within the body of the insole.

5 The metatarsal insert 26 is arranged to span the full width of the body
20 of the insole at the metatarsal region thereof between opposing sides 32 of the
insert. The sides 32 of the metatarsal insert 26 extend upwardly through respective
recesses 34 in opposing sides of the body of the insole. The sides 32 of the
metatarsal insert 26 thus extend upwardly beyond an upper surface of the body of
10 the insole so that an internal width defined between the opposing sides 32 of the
metatarsal insert 26 define the internal width of the article of footwear when the
insole is inserted therein for fitting the foot of the person therebetween. The
recesses 34 in opposing sides of the insole are suitably arranged to mate with the
cross sectional area of the sides 32 projecting upwardly therethrough.

15 The heel and arch insert 30 generally comprises a single piece of
moulded material including both a heel cup portion 36 and an arch portion 38 which
are integrally formed. The heel cup portion 36 is defined by a recess 40 centrally
located in a top side of the heel and arch insert 30 adjacent the heel of the body 20
of the insole. The recess 40 is suitably sized for suspending a central portion of the
20 heel of the person therein. The body 20 of the insole spans the recess 40 in the
heel and arch insert there above.

25 An intermediate heating layer 42 is provided including a plurality of
spaced apart heating elements 44 which comprise heating filaments suspended
within the body 20 of the insole. The heating layer 42 is located at an intermediate
position between the top and bottom sides of the body 20 of the insole with the body
of the insole being integrally injection moulded thereabout the heating layer.

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The heating layer includes a switch mechanism 46 supported within the insole which controls activation of the heating elements by selectively connecting the elements to a suitable power source 48 also supported within the insole. The switch mechanism 46 and the power source 48 are located within the heel and arch insert 30 at an arch of the insole in communication with the heating elements 44 suspended within the body 20 of the insole.

The switch mechanism 46 is suitably arranged to activate the heating elements only when depressed by the action of a person stepping or standing of the insole. When the article of footwear is removed, the switch mechanism 46 thus ensures that the heating elements will not be activated. Suspension of the power source 48 and switch mechanism 46 within the heel and arch insert 30 permits ready replacement thereof by replacing the insert 30 if required. The heating layer 42 remains flexible for conforming to the variable shapes provided by the variable durometer of the inserts 26 and 30.

The footwear and insole as described herein including numerous advantages, including a larger foot bed due to the use of an expanded last dimension around which the shoe or boot is made. Over the years last dimensions of shoes and boots has not changed, making it impossible to add any meaningful support to the forefoot. Creating a substantially deeper foot bed is crucial to designing any support for the fore foot.

Together with a deeper foot bed the present invention now has the ability to include a thicker insole. In all the prior art of shoe making the dimensional space created by the last did not allow for a larger, thicker insole.

The purpose of such a thicker insole has three main aspects, they are as follows:

A. Corrective Orthotic

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The thicker dimensions of this insole allow the present footwear to correct the gait of the individual by altering the strike pattern of the foot. The elevations required to accomplish this are not present in other shoes or their insoles.

B. Shock Absorbing Qualities

5 Current prior art has an insole thickness of approximately 0.187 inch. This is not nearly enough to absorb the shock or impact of the average 170 pound man. Any impact not taken up by the shock absorbing qualities of the footwear is automatically distributed throughout the body. This impact will over time hurt the ankles, knees, hips and back causing a deterioration of joint tissues. The walking or
10 running stride results in approximately 10-15 pounds per square inch of force to be applied to the bottom of the feet.

Nearly 80% of this force is distributed between the calcaneus, the first and fifth metatarsals. Due the very small area of pressure and the relatively high pounds per square inch of force applied, these three structures tend to break down
15 the insoles ability to absorb shock. Therefore, the shock absorbing qualities of the 0.187 inch insole thickness is far exceeded by the dynamic weight of the individual. The insole of the present invention has a thickness dimension of approximately 0.75 inch, giving it more than 4 times the shock absorbing potential.

C. Functionally Alterable

20 The insole according the present invention combines the thickness and the appropriate durometer of material to maximize its shock absorbing abilities. By including interchangeable inserts the insole has the ability to accommodate the weight and dynamic forces created by any person.

25 This is accomplished by providing an insole of sufficient thickness and durometer throughout (including the metatarsal region) that the force of an adult person of average weight through a stepping motion on the insole does not exceed

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maximum compression of the material forming the insole. As noted in Figure 6, the maximum compression is defined as the point in the curve of Material Thickness vs. Applied Force of Compression for a given material at which the slope of the curve changes considerably due to the material having reached a point at which further applied force results in relatively minimal further compression and accordingly the rate of compression is significantly reduced.

The thicker insole of the appropriate durometer can quantifiably improve the functioning of most footwear provided that this footwear is equipped to accommodate the larger insole dimensions.

As noted above, the footwear according to the present invention includes the following characteristics:

1. Deeper Foot bed

The construction of a larger foot bed is accomplished through the development of a deeper and broader last on which the footwear is made. The size of this last is substantially larger than what is currently accepted in the industry.

2. Thicker Insole

The larger foot bed is able to accommodate a larger more substantial insole. The insole is nearly .75 inches thick and is contoured to support the heel, arch and the metatarsals of the foot.

3. Removable and interchangeable inserts

Each of the high impact or high pressure areas of the foot is equipped with a removable or interchangeable insert. These inserts may be constructed of dissimilar materials in order to provide the greatest comfort and functionality. e.g. A heavier person will require an insert of denser durometer thereby maintaining the proper dynamic support. An individual who has flatter feet will be able to soften the arch by reducing the density of the arch material. Areas which are specifically

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addressed include: the Metatarsals, the Arch and the heel cup.

4. Posting (corrective) Insert

The insole will be able to include a posting insert for the heel to act against over pronation and supination. These inserts may be placed by the user
5 through the instruction of an educational CD ROM.

5. Extended insole boarders

At strategic locations the insole edges will be extended up and outward while thinning toward the outer edge of the insert. The purpose of this is to contain the foot within the shoe or boot in any dynamic circumstance, thereby preventing the
10 foot from shifting or sliding about. The second reason for this extension is to accommodate a greater range of foot widths with in the same larger foot bed.

When used as a kit, the insoles 10 can be sold with footwear in sets having varying characteristics, but still having outer dimensions suitably sized and associated with the foot bed of a particular size of article of footwear. A person
15 would thus select the size of footwear article which most closely matches the size of the foot of the person along with the appropriate set of insoles belonging to that particular size of article of footwear. For proper fitting, one insole of the set is selected for each article of footwear in a pair having characteristics which most closely match the desired characteristics by the wearer. The selection is based
20 upon either a desired durometer which may vary between the inserts or the body of the insoles. The particular shape and size of the insole can also be varied within the insoles of a particular set by providing different heel and arch combinations as well as varying internal widths between opposing sides of the metatarsal insert. A set of insoles associated with each article of footwear can thus be pre-made or varied by
25 providing variable Inserts 26 and 30. Either option would provide a suitable set of insoles associated with each size of article of footwear for optimally customising

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support and comfort of the wearer of the article of footwear.

While one embodiment of the present invention has been described in the foregoing, it is to be understood that other embodiments are possible within the scope of the invention. The invention is to be considered limited solely by the scope
5 of the appended claims.

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CLAIMS:

1. An article of footwear comprising:
an outsole for engaging the ground;
a shoe body supported on the outsole, including an internal foot bed
5 for receiving a foot of a person therein; and
an insole having a depth which is at least 1/4 inch at a metatarsal
region thereof for supporting the foot of the person thereon;
the foot bed having an internal height which is suitably sized for
comfortably receiving therein both the insole and the foot of the person supported on
10 the insole.
2. An article of footwear comprising:
an outsole for engaging the ground;
a shoe body supported on the outsole, including an internal foot bed
for receiving a foot of a person therein; and
15 an insole for supporting the foot of the person thereon;
the insole being formed of a material having a maximum compression
defined when additional force applied to the insole results in a substantially reduced
rate of compression of the material;
the insole having a thickness and a durometer at a metatarsal region
20 thereof such that the maximum compression is not reached when the insole is
stepped on by an adult person of average weight;
the foot bed having an internal height which is suitably sized for
comfortably receiving therein both the insole and the foot of the person supported on
the insole.
- 25 3. The article of footwear according to either Claim 1 or 2 wherein
the insole comprises an insole body and a plurality of inserts, each arranged to be

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received within the Insole body to vary the characteristics of the Insole body.

4. The article of footwear according to Claim 3 wherein the inserts include a metatarsal insert which is located at a metatarsal region of the insole.

5 5. The article of footwear according to either one of Claims 3 and 4 wherein the Inserts are located at both a metatarsal region and a heel and arch region of the insole.

6. The article of footwear according to any one of Claims 1 through 5 wherein the insole is raised upwardly on opposing sides at a metatarsal region thereof.

10 7. The article of footwear according to any one of Claims 1 through 6 wherein the insole has a substantially uniform thickness throughout.

8. The article of footwear according to any one of Claims 1 through 7 wherein the insole has an average thickness between 1/4 of an inch and 3/4 of an inch.

15 9. The article of footwear according to any one of Claims 1 through 8 wherein the insole has a minimum thickness of approximately 1/2 inch.

10. The article of footwear according to any one of Claims 1 through 8 wherein the insole has an approximate thickness of 3/4 inch.

20 11. The article of footwear according to Claim 4 wherein the metatarsal insert includes sides which are raised upwardly on opposing sides of the insole at a metatarsal region thereof.

25 12. The article of footwear according to Claim 4 wherein the metatarsal insert is received in a bottom side of the insole and wherein the insole includes recesses in opposed sides thereof for receiving the sides of the metatarsal insert upwardly therethrough.

13. The article of footwear according to any one of Claims 1 through

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12 wherein there is provided a heating element within each insole having a power supply and being arranged to selectively provide heat to the insole.

14. The article of footwear according to Claim 13 wherein the insole is injection molded integrally about the heating element.

5 15. The article of footwear according to Claim 13 wherein the heating element is activated by depressing the foot of the person on the insole.

16. The article of footwear according to Claim 13 wherein the heating element is operated thermostatically.

10 17. A method of sizing an article of footwear to a foot of a person, the method comprising:

providing multiple articles of footwear each having a shoe body with differing internal dimensions and an outsole;

15 providing a set of insoles associated with each article of footwear which is suitably sized to be received within the internal dimensions of the article of footwear, each insole of the set having differing characteristics than remaining insoles of the set;

selecting an article of footwear having internal dimensions which most closely accommodates the foot of the person; and

20 selecting an insole, of the set of insoles associated with the selected article of footwear, having characteristics which are most closely matched to characteristics of the foot of the person.

18. The method according to Claim 17 wherein the insoles of each set have differing durometer.

25 19. The method according to Claim 17 wherein the insoles of each set have differing foot bed dimensions upon which the foot rests.

20. The method according to Claim 17 wherein the insoles are

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raised upwardly on opposing sides at a metatarsal region thereof, the insoles of each set having differing internal dimensions between the opposing sides thereof at the metatarsal region.

21. The method according to Claim 17 wherein the set of insoles
5 comprises a single insole body and a plurality of inserts, each arranged to be received within the insole body to vary the characteristics of the single insole body.

22. The method according to Claim 21 wherein the inserts are
received in mating recesses in a bottom side of the insole body and wherein the
inserts are reduced in cross sectional dimension at a bottom side thereof in relation
10 to a main portion thereof for wedging the inserts within the respective mating recesses.

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